

TOTAL MOISTURE CONTENT OF AGGREGATE BY DRYING

AASHTO T 255

SCOPE

The moisture content in aggregate needs to be determined to identify aggregate absorption for allowable water considerations for portland cement concrete, to determine moisture of combined aggregates for HMA binder content establishment, and to determine the density of materials.

Basically, a known amount of aggregate is obtained, heated to remove the moisture, and the percentage of moisture determined. Ovens, hot plates, heat lamps or microwave ovens are used for heating the sample.

SUMMARY OF TESTS

Apparatus

Balance, general purpose class G₂ (AASHTO M 231)

Source of Heat, oven capable of maintaining a temperature of $239 \pm 9^{\circ}\text{F}$ ($110 \pm 5^{\circ}\text{C}$), electric or gas hot plate, electric heat lamps, or microwave oven

Sample Container, suitable for method of heating

Heat Sources for Aggregate Drying

There are several alternatives to choose from when drying aggregates.

Hot Plate: an excellent choice when in a hurry; however, care should be taken to avoid excessive localized overheating and fracturing of aggregates. When a hot plate is used, the sample is stirred repeatedly while observing the state of the aggregate. Some types of aggregate will not tolerate the high localized heat and may fracture despite the best of care. In this case, an oven should be used.

Note: If fracturing of the aggregate occurs, take another sample and retest.

Oven: The most common is probably an oven regulated at $230 \pm 9^{\circ}\text{F}$ ($110 \pm 5^{\circ}\text{C}$). An oven is a good choice when time is not of the essence. Samples dried in the oven, depending on the type of container used and the moisture content of the sample, can take anywhere from one to several hours to dry to a constant weight. The benefit of using an oven is that it is very unlikely that sensitive aggregate will overheat and fracture.

Microwave: this is quicker solution than a hot plate, except that microwave drying will often fracture and pop the aggregate particles. Some experimentation will be necessary to ensure the best settings for the material, to avoid this situation. The microwave should NOT be used where there is metal or metal oxides present in the aggregate.

Sample

The aggregate sample shall be obtained in accordance with AASHTO T 2 and protected against loss of moisture prior to determining the weight. An air-tight container or plastic bag is best for this purpose. The size of sample shall be as follows:

Nominal Maximum Size, mm (in.)	Minimum Sample Weight lb(kg)
#4 (4.75)	1.1 (0.5)
3/8 (9.5)	3.3 (1.5)
1/2 (12.5)	4.4 (2)
3/4 (19.0)	6.6 (3)
1 (25.0)	8.8 (4)
1 1/2 (37.5)	13.2 (6)
2 (50.0)	17.6 (8)

Procedure

1. Weigh the sample and record the weight (W)
2. Dry the sample until there is less than 0.1% change in weight over subsequent weighings.
3. Record the weight (D) of the sample after it has cooled sufficiently not to damage the balance.

Calculation

The calculation for moisture content (P) is as follows:

$$P = 100 \frac{(W - D)}{D}$$

where:

P = moisture content of sample, %

W = original wet weight of sample, gms

D = dry weight of sample, gms

Example:

$$W = 546.2 \text{ gms. } D = 541.2 \text{ gms}$$

$$P = 100 \frac{(546.2 - 541.2)}{541.2}$$

$$P = \frac{500}{541.2}$$

$$P = 0.92\%, \text{ record as } 0.9\%$$

The moisture content is calculated to the nearest first decimal place (0.0).